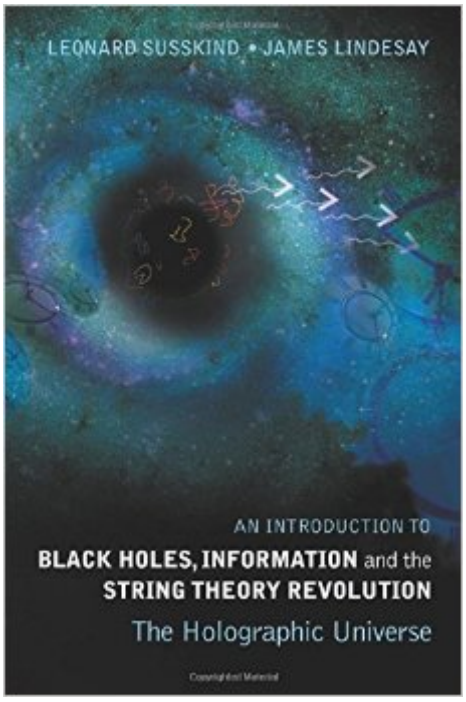
An Introduction To Black Holes, Information And The String Theory Revolution: The Holographic Universe



Synopsis

Over the last decade the physics of black holes has been revolutionized by developments that grew out of Jacob Bekenstein s realization that black holes have entropy. Stephen Hawking raised profound issues concerning the loss of information in black hole evaporation and the consistency of quantum mechanics in a world with gravity. For two decades these questions puzzled theoretical physicists and eventually led to a revolution in the way we think about space, time, matter and information. This revolution has culminated in a remarkable principle called The Holographic Principle , which is now a major focus of attention in gravitational research, quantum field theory and elementary particle physics. Leonard Susskind, one of the co-inventors of the Holographic Principle as well as one of the founders of String theory, develops and explains these concepts.

Book Information

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Customer Reviews

The title of the book reminds me of the classic physics question: yes, this equation can be expanded for small values of the parameter. But before you whip out that expansion, first tell me what "small" means in this context?I would venture to say that the title of the book is a misnomer on some level. This is a technical book, there’s no question about that. If you are not a physicist, you will not understand a single page. When I say "technical", what I specifically mean is you should have:* A course on general relativity. The first page dumps the Schwarzschild metric on you. You should be familiar with, say, the Faraday tensor (which any decent GR or even SR course should cover).* A course on quantum field theory. The book very quickly goes into the massless free

Klein-Gordon equation in a Schwarzschild background. You should know the basics of string theory. After all, that's what the book is partially about!* A course on thermo/statistical mechanics. The book delves into black hole entropy. Be prepared to blow the dust off your partition functions.In that sense, this book is not an introduction, and is CERTAINLY not for the layperson. Now that I've disparaged this book enough, I'll tell you why this is a phenomenal book that deserves a place on your bookshelf (again, for certain values of "you").This book is a gentle introduction to the classical and quantum mechanical principles of blackholes. It was beautifully written. It may very well be one of my favorite books. When I say "beautiful", I don't mean beautiful like Wald's classic but impenetrable book on GR. Imagine David Griffiths or Matt Visser writing a book for mid-level grad students going into high energy physics.

This book is an exciting review of the most important ideas that have emerged in our quest to understand black holes - essential labs that tell us a lot about quantum gravity and the deepest mysteries of the Universe.It is an introduction but an introduction for a person who is serious about black holes, not just a person who wants to impress his friends with two emotional sentences about them!Nevertheless, ordinary people should give it a try, especially plumbers because the author is also an ex-plumber whose father was a plumber and wanted his son to continue in the tradition.It just happened that Susskind also became one of the top 5 black hole experts in the world. Please don't ask me to tell you who are the remaining four because it could be a tough task.He's been waging a war against some superficially acceptable but wrong ideas - such as the information loss - and he became the winner. Meanwhile, he also co-discovered string theory and other things.I don't know James Lindesay too well, so let me talk about Susskind as the author.At the beginning of the book, you are presented with the geometry of the Schwarzschild black hole - especially what is its causal structure. Equations but also pictures are included. Various coordinates are used to find out who can escape from where etc. i.e. what is the causal diagram.Following chapters are dedicated to quantum fields in this curved background and particle production, Unruh radiation and density matrix etc. When they have everything, they can finally explain why black hole evaporate (they're not quite black) and why they have a temperature and entropy.Charged black holes differ in some details and they are explained, too.

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